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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/766,520	01/19/2001	Jin-Sung Kim	41546/DBP/Y35	9778

23363 7590 08/28/2002

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EXAMINER

TSANG FOSTER, SUSY N

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 08/28/2002

6

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/766,520

Applicant(s)

KIM ET AL.

Examiner

Susy N Tsang-Foster

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Information Disclosure Statement*

2. The information disclosure statements filed on 1/19/2001 and 4/17/2001 have been considered by the Examiner.

### *Specification*

3. The incorporation of essential material in the specification by reference to a foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference. The amendment must be accompanied by an affidavit or declaration executed by the applicant, or a practitioner representing the applicant, stating that the amendatory material consists of the same material incorporated by reference in the referencing application. See *In re Hawkins*, 486 F.2d 569, 179 USPQ 157 (CCPA 1973); *In re Hawkins*, 486 F.2d 579, 179 USPQ 163 (CCPA 1973); and *In re Hawkins*, 486 F.2d 577, 179 USPQ 167 (CCPA 1973).

It is recommended to the applicants to state instead "This application claims priority to application Nos. 2000-2947 and 2000-81253 respectively filed in the Korean Industrial Property Office on January 21, 2000 and December 23, 2000.

***Claim Objections***

4. Claims 1 and 5 are objected to because of the following informalities: In claims 1 and 5, the Markush group “a sulfone based organic compound selected from the group consisting of a compound represented as in the following Formulae (I) (II), or (III), and a mixture thereof” is improper. It is recommended to the applicants to rewrite the Markush group as “a sulfone based organic compound selected from the group consisting of a compound represented by Formula (I), a compound represented by Formula (II), a compound represented by Formula (III), and a mixture thereof.”

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 5, the limitation “substituted primary, secondary, or tertiary alkyl group, alkenyl group, and aryl group” is indefinite because it is unclear how the groups are substituted. It is unclear to one of ordinary skill in the art what substituents are meant to be claimed by applicants since there are innumerable kinds of substituents.

In claims 1 and 5, the Markush group for R and R' is confusing as written. It is unclear if the substituted primary, secondary, or tertiary alkyl group, alkenyl group, and aryl group is part

Art Unit: 1745

of the Markush group. It is recommended to the applicants to rewrite the Markush group for R and R' as "where R and R' are independently selected from the group consisting of a primary alkyl group, a secondary alkyl group, a tertiary alkyl group, an alkenyl group, an aryl group, a halogen substituted primary alkyl group, a halogen substituted secondary alkyl group, a halogen substituted tertiary alkyl group, a halogen substituted alkenyl group, and an halogen substituted aryl group."

Claim 2 recites the limitation "the substituent" in line 2. There is insufficient antecedent basis for this limitation in the claim.

In claim 4, the limitation "wherein the amount of sulfone based organic compound is 0.1 to 10 weight%" is indefinite because it is unclear what is the basis for the percentage.

Claims depending from claims rejected under 35 USC 112, second paragraph are also rejected for the same.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Art Unit: 1745

8. As best understood, claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Marple (US 5,290,414).

Marple discloses a lithium battery comprising a negative electrode (anode) that can be made of lithium metal, lithium intercalated carbon, or lithiated carbon (col. 6, lines 40-48) and a positive electrode (cathode) that can be made of lithiated cobalt oxides, lithiated nickel oxides, and lithiated manganese oxides (col. 6, lines 49-63). The electrolyte comprises a solute dissolved in a mixture of dioxolane and an acyclic ether based solvent which are non-aqueous organic solvents (col. 8, lines 23-27) and a cosolvent in an amount less than 25 weight percent based on the weight of the solvent of the electrolyte solution can be sulfolane (col. 9, line 8 to col. 10, line 4). Sulfolane is another chemical name for tetramethylene sulfone.

9. As best understood, claims 1, 3, and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 5-307974 A (Machine translation).

JP 5-307974 A discloses a lithium secondary battery comprising a carbon active material in a negative electrode, a lithium cobalt oxide active material in a positive electrode, and an electrolyte made of a mixed solvent of a sulfolane (tetramethylene sulfone) and ethylene carbonate which is a non-aqueous organic solvent (see paragraphs 9-15 of machine translation).

10. As best understood, claims 1, 3, and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by Gernov et al. (US 6,194,099 B1).

Gernov et al. discloses an electrolyte for a lithium secondary battery (col. 16, lines 45-61), the electrolyte comprising 1.0 M lithium imide in a 5/2/2/1 blend by volume of 1,3-

Art Unit: 1745

dioxolane/diglyme/dimethoxyethane/sulfolane (col. 21, lines 15-22). Calculations would show that the electrolyte solution contains 9.7 wt % sulfolane based on the weight of the electrolyte. Values used for the densities of 1,3-dioxolane, diglyme, dimethoxyethane, and sulfolane are respectively 1.06, 0.94, 0.8683, and 1.261 g/cm<sup>3</sup>.

11. As best understood, claims 1, 2, and 5 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Angell et al. (US 6,245,465 B1).

See abstract; col. 4, lines 33-36; col. 4, line 63 to col. 6, line 46; and col. 7, lines 8-37 of the reference.

12. As best understood, claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by WO99/16144 (equivalent document EP1030399 A1 relied upon for translation).

WO99/16144 discloses a lithium secondary battery comprising a lithium transition metal oxide active material in the positive electrode; a carbonaceous material, a lithium metal, or a lithium metal alloy for the negative electrode; and an electrolyte comprising an organic solvent containing at least one compound represented by the formula (1):



where R<sub>1</sub> and R<sub>2</sub> independently represent an alkyl group which may be substituted with an aryl group or halogen atom; an aryl group which may be substituted with an alkyl group or halogen atom; or may be taken together to form together with -A-, a cyclic structure which may contain an unsaturated bond where A can be represented by a sulfone group shown in Formula (3) (see paragraphs 10-14 on pages 2 and 3 of EP 1030399 A1).

Art Unit: 1745

Specific examples of formula (3) are methyl sulfone (dimethyl sulfone), phenyl sulfone (diphenyl sulfone), benzyl sulfone (dibenzyl sulfone), tetramethylene sulfone (sulfolane); butadiene sulfone (sulfolene), and halides of these chain and cyclic sulfones (see paragraph 22 on page 4 of EP 1030399 A1).

The amount of the compound represented by formula (1) contained in the organic solvent of the nonaqueous electrolyte solution is preferably 0.1 to 15 vol % (see paragraph 28 on page 5 of EP 1030399 A1).

Example 12 in Table 1 is an electrolyte solution having SLE:EC:DEC in a volume ratio of 10:45:45 and 1.0 M  $\text{LiPF}_6$  as the electrolyte salt where SLE stands for sulfolene, EC is ethylene carbonate and DEC is diethyl carbonate (see paragraph 58 on page 8 and paragraph 61 on page 9 of EP 1030399 A1). Calculations would show that the electrolyte solution contains 9.98 wt% of sulfolene using 1.314, 1.321, and 0.975  $\text{g/cm}^3$  respectively for the densities of sulfolene, ethylene carbonate, and diethyl carbonate.

### ***Conclusion***

13. Any inquiry concerning this communication or earlier communications should be directed to examiner Susy Tsang-Foster, Ph.D. whose telephone number is (703) 305-0588. The examiner can normally be reached on Monday through Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900.



Art Unit: 1745

The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9310 for regular communications and (703) 872-9311 for After-Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

st/26 August 2002

*Susy Isany Foster*